ISSN 1809-127X (online edition)
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LISTS OF SPECIES

Butterfly (Rhopalocera) fauna of Maharashtra Nature Park, Mumbai, Maharashtra, India

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ABSTRACT: Mumbai, one of the largest metro cities in the world, holds rich biodiversity in few green fragmented natural or manmade habitats. One such habitat is the Maharashtra Nature Park (MNP). MNP is located in a highly polluted area of Mumbai; this was a dumping ground for nearly 26 years. In 1983, it was restored into a semi-natural forest with the initial technical inputs from World Wide Fund for Nature-India (WWF-India). Presently, this nature park supports a rich biodiversity but lacks proper documentation. Such information is essential as the park serves as an important study area for many schools, college students and for many nature lovers. Previous documentation has reported 38 butterfly species from the park. The present study carried out from June 2005 to November 2005 has documented 53 species belonging to five families from MNP.

INTRODUCTION

Municipal Corporation of Greater Mumbai (MCGM) constitutes of two districts, viz. Mumbai City and Mumbai Suburban spanning over an area of 437.71 km^2. Besides being a densely populated and polluted city, Mumbai holds rich biodiversity. There are many green pockets in Mumbai, *viz*. Veermata Jijabai Bhosale Udyan, Bombay Port Trust Garden, Aarey Colony, Maharashtra Nature Park (MNP) and a part of Sanjay Gandhi National Park (SGNP). Although the biodiversity is rarely mentioned in connection with green areas such as parks, gardens etc., documentation of local biodiversity is important to develop proper conservation plans. Very few studies have been carried out in Mumbai to document the butterfly diversity. Aitkin and Comber (1903a; b) reported 95 species from Mumbai and its surroundings, Best (1951) reported 105 species from Bombay and Salsette. Kurve and Pejavar (2004) documented 41 species of butterflies from Bandodkar College Campus located in the city of Thane whereas Kurve and Patwardhan (2005) documented 56 species from the same locality. Both these areas fall in the district of Thane which is adjacent to Mumbai. But there are no recent studies for such small nature parks or urban areas in Mumbai. The present study, therefore, stands important through which the butterfly diversity of one of the green pockets from Mumbai has been documented.

MATERIALS AND METHODS

Study Area

Maharashtra Nature Park (19°03' N, 72°51' E and 19°05' N, 72°51' E) (Figure 1) was one of the garbage dumps or landfills. When it reached to its capacity, Mumbai Metropolitan Region Development Authority (MMRDA) decided to restore it ecologically. Thus, the restoration was started by MMRDA with the help and inputs from the World Wide Fund for Nature-India (WWF-India) in 1983 and continued for nine years. It is probably the first example of manmade forest in the city of Mumbai.

The park is spanning over 0.14 km^2 (37 acres) area. It is situated in the "H" Block of Bandra-Kurla Complex (Bandra-Sion Road) on the Southern bank of Mithi River. According to MMRDA, which is the governing body of MNP, the park harbors 38 different butterfly species. It also hosts about 280 different species of angiosperms, 80 of birds and 25 of amphibians and reptiles (Monga 2005).

The average temperature in summer varies between 30-32° C while the average winter temperature varies between 16-18° C. The average annual precipitation is 2160 mm. The vegetation of mainly includes *Aegle marmelos*, *Artabotrys hexapetalous*, *Bauhinia racemosa*, *B. variegata*, *Cassia fistula*, *C. tora*, *Duranta plumeri*, *Ficus benghalensis*, *F. racemosa*, *F. religiosa*, *Lantana camara*, *Polyalthia longifolia*, *Saraca asoka*, *Tamarindus indicus*, *Terminalia arjuna* and *Vitex nigundo*.

Data Collection

The Maharashtra Nature Park area was surveyed from June 2005 to November 2005 to assess the diversity of butterflies in the manmade forest. The requisite permissions were obtained through proper paper work from the concerned authorities of MNP to carry out the study.

Pollard walk method (Pollard 1977; Pollard and Yates 1993) was followed for observing butterflies, i.e., walking along the fixed paths while recording and counting the species. The observation width was limited to about 5 m. Butterflies were observed during sunny days (n = 24) from 8:00 h to 12:00 h once in a week. They were identified in the field using field guides by Gunathilagaraj *et al.* (1998), Kunte (2000) and followed classification given by Gaonkar (1996).

RESULTS AND DISCUSSION

Fifty-three species of butterflies belonging to five families (Table 1 and 2) were recorded during the study. Nymphalidae was the richest family, comprising 23

registered species (43 %) followed by Pieridae (13 species, 25 %), Lycaenidae (10 species; 19 %), Papilionidae (5 species; 9 %) and Hesperiidae (two species; 4 %) (Figure 2).

The diversity and abundance of species is highly correlated with the availability of food plants in the surroundings (Kunte 2000) and therefore, more studies will help the management and conservation of the park's diversity. Occurrence of maximum number of species in the family Nymphalidae could be the result of high availability of food plants in the study area. Fourteen different larval food plants belonging to seven angiospermic families are fed by Nymphalids butterflies, where as Papilionids feed on eight food plant species belonging to two families. Pierids feed on six food plant species, belonging to four families, where as Lycaenids feed on two plants belonging to two families and Hesperiids feed on single food plant. Larval food plants include *Annona squamosa, Artabotrys hexapetalus, Polyalthia longifolia* (Annonaceae); *Aegle marmelos, Citrus limon, Murraya panniculata, M. koenighii, Feronia limonia* (Rutaceae); *Cassia fistula, Cassia tora,* (Caesalpiniaceae); *Loranthus* spp. (Loranthaceae); *Pithecellobium dulce* (Mimosaceae); *Capparis spinosa, Cleome viscosa* (Capparidaceae); *Ricinus communis* (Euphorbiaceae), *Calotropis gigantea* (Asclepiadaceae), *Ficus racemosa, F.bengalensis, F.religiosa, F. montana, F. nitida* (Moraceae); *Neolamarkiana cadamba, Mitragyna parviflora, Mussaenda frondosa* (Rubiaceae); *Eleusine sps., Oplismenus composits* (Poaceae); *Nerium oleander* (Apocynaceae); *Pongamia pinnata* (Fabaceae); *Plumbago zeylanica* (Plumbaginaceae); *Bryophyllum pinnatum* (Crassulaceae); *Curcuma* spp. (Zingiberaceae).

Despite the fact that butterflies travel in searching for food, it will be interesting to study whether butterflies locally migrate from the natural forest of SGNP to this manmade forest or vice versa. A very recent study (Gokarnkar *et al.* 2008) in the same region has recorded 56 species of butterflies and therefore there is merely any chance to say that present study was affected by 'July 2005' deluge.

Table 1. Butterfly families and their number of species recorded in Maharashtra Nature Park, Mumbai.

Family	Number of species
Papilionidae	5
Pieridae	13
Lycaenidae	10
Nymphalidae	23
Hesperiidae	2
Total	**53**

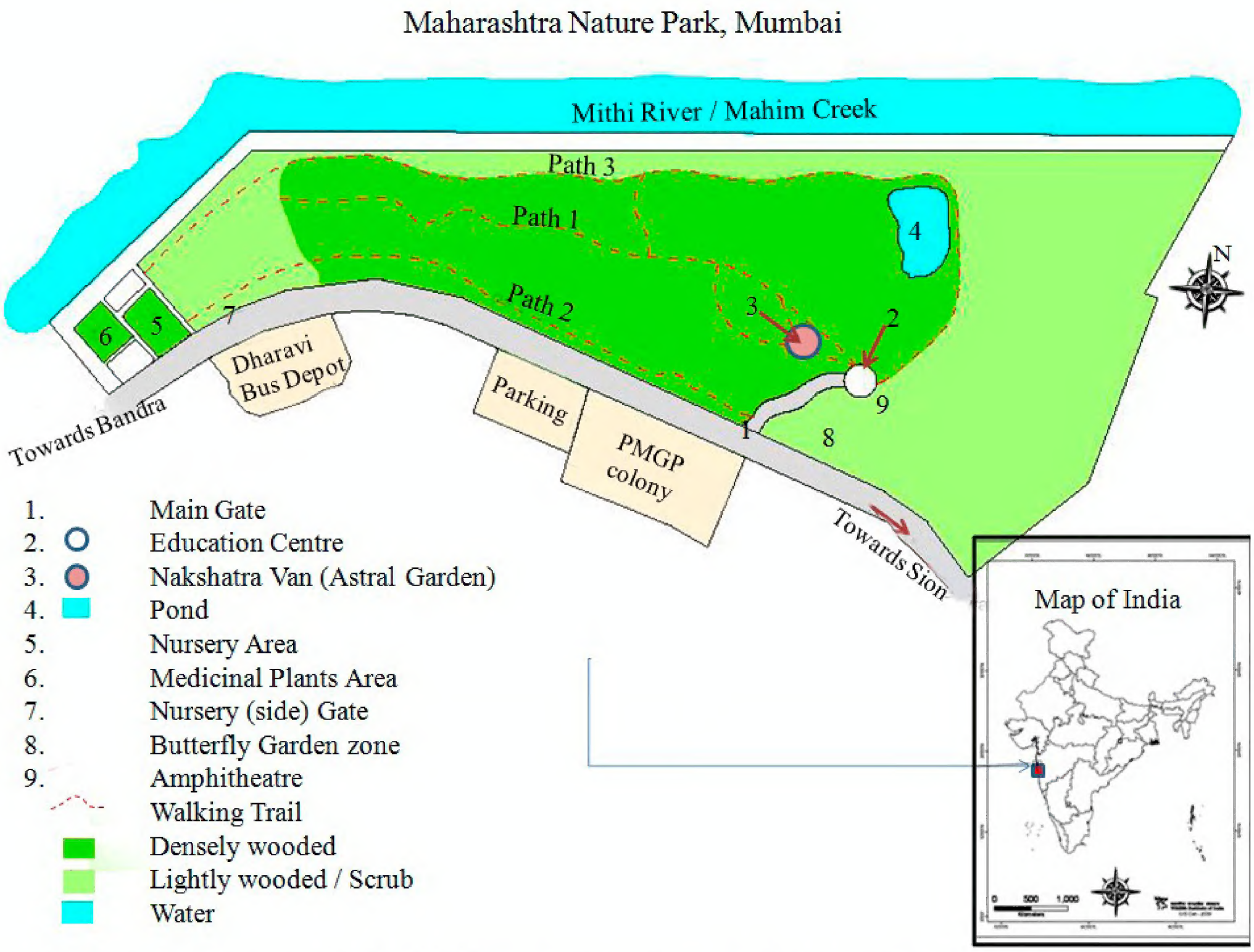

Figure 1. Map of Maharashtra Nature Park (MNP) [The box on map of India only represents the districts of Mumbai in a small part of which Maharashtra Nature Park is located].

Table 2. Butterfly checklist of Maharashtra Nature Park, Mumbai

Family	Common Name	Scientific Name
Papilionidae		
	Jay, Common	*Graphium doson* (C & R Felder, 1864)
	Jay, Tailed	*Graphium agamemnon* (Linnaeus, 1758)
	Lime Butterfly	*Papilio demoleus* (Linnaeus, 1758)
	Mormon, Blue	*Papilio polymnestor* (Cramer, 1775)
	Mormon, Common	*Papilio polytes* (Linnaeus, 1758)
Pieridae		
	Albatross, Common	*Appias albina* (Boisduval, 1836)
	Emigrant, Common	*Catopsilia pomona* (Fabricius, 1775)
	Emigrant, Mottled	*Catopsilia pyranthe* (Linnaeus, 1758)
	Grass Yellow, Common	*Eurema hecabe* (Linnaeus, 1758)
	Grass Yellow, Small	*Eurema brigitta* (Cramer, 1780)
	Gull, Common	*Cepora nerissa* (Fabricius, 1775)
	Jezebel, Common	*Delias eucharis* (Drury, 1773)
	Orange Tip, Great	*Hebomoea glaucippe* (Linnaeus, 1758)
	Orange Tip, Yellow	*Ixias pyrene* (Linnaeus, 1764)
	Pioneer	*Anaphaeis aurota* (Fabricius,1793)
	Psyche	*Leptosia nina* (Fabricius,1793)
	Salmon Arab, Small	*Colotis amata* (Fabricius,1775)
	Wanderer, Common	*Pareronia valeria* (Cramer,1776)
Lycaenidae		
	Pierrot, Angled	*Caleta caleta* (Hewitson,1876)
	Pierrot, Common	*Castalius rosimon* (Fabricius,1775)
	Pierrot, Red	*Talicada nyseus* (Guèrin-Mènèville, 1843)
	Pierrot, Rounded	*Tarucus nara* (Kollar, 1848)
	Blue, Zebra	*Leptotes plinius* (Fabricius,1793)
	Cerulean, Common	*Jamides celeno* (Cramer, 1775)
	Grass Blue, Pale	*Pseudozizeeria maha* (Kollar, 1844)
	Hedge Blue, Common	*Actolepis puspa* (Horsefield, 1828)
	Jewel, Grass	*Freyeria trochylus* (Freyer, 1845)
	Silverline, Common	*Spindasis vulcanus* (Fabricius, 1775)
Nymphalidae		
	Baron, Common	*Euthalia aconthea* (Cramer,1777)
	Baronet	*Euthalia nais* (Forster,1771)
	Castor, Angled	*Ariadne ariadne* (Linnaeus,1763)
	Castor, Common	*Ariadne merione* (Cramer, 1779)
	Commander	*Moduza procris* (Cramer, 1777)
	Coster, Tawny	*Acraea violae* (Fabricius, 1793)
	Eggfly, Danaid	*Hypolimnas misippus* (Linnaeus, 1764)
	Eggfly, Great	*Hypolimnas bolina* (Linnaeus, 1758)
	Evening Brown, Common	*Melanitis leda* (Linnaeus, 1758)
	Indian Crow, Common	*Euploea core* (Cramer, 1780)
	Leopard, Common	*Phalanta phalantha* (Drury, 1773)
	Oakleaf, Blue	*Kallima horsfieldii* (Kollar, 1848)
	Painted Lady	*Cynthia cardui* (Linnaeus, 1758)
	Pansy, Blue	*Junonia orithya* (Linnaeus, 1758)
	Pansy, Gray	*Junonia atlites* (Linnaeus, 1763)
	Pansy, Lemon	*Junonia hierta* (Fabricius, 1798)
	Pansy, Peacock	*Junonia almana* (Linnaeus, 1758)
	Rajah, Black	*Charaxes solon* (Fabricius, 1793)
	Sailer, Common	*Neptis hylas* (Moore, 1872)
	Tiger, Blue	*Tirumala limniace* (Cramer, 1775)
	Tiger, Glassy	*Parantica aglea* (Stoll, 1782)
	Tiger, Plain	*Danaus chrysippus* (Linnaeus, 1758)
	Tiger, Striped	*Danaus genutia* (Cramer, 1779)
Hesperiidae		
	Awl, Common Banded	*Hasora chromus* (Cramer, 1782)
	Swift, Rice	*Borbo cinnara* (Wallace, 1866)

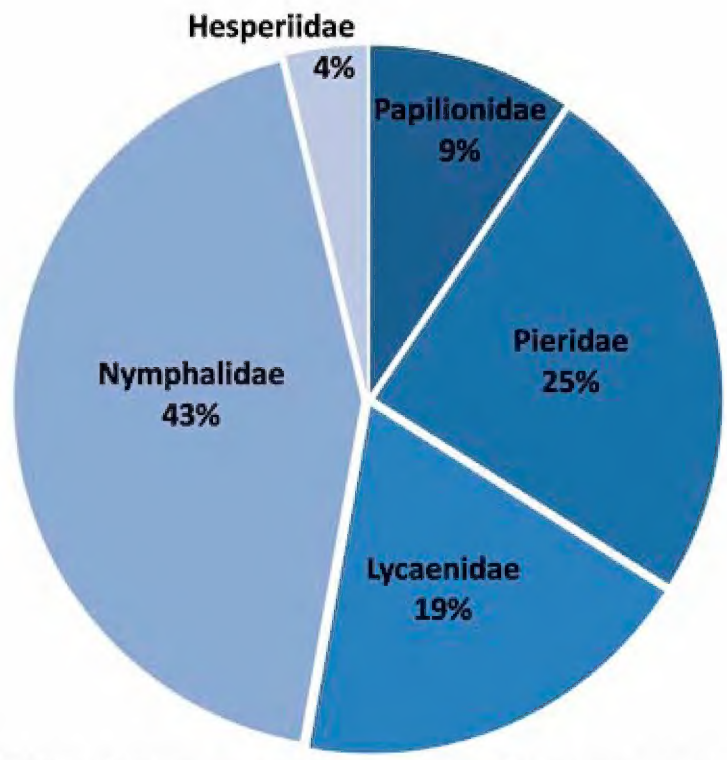

Figure 2. Familywise species encountered in Maharashtra Nature Park

Acknowledgments: We are thankful to Avinash Kubal, Deputy Director of MNP Society, for providing the necessary permissions and to Vikram Pawar for digitizing maps.

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Received: July 2009
Revised: November 2009
Accepted: December 2009
Published online: February 2010
Editorial responsibility: Ana Lúcia Tourinho